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# Characteristics of the European Automotive System: Is There a Distinctive European Approach?

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## Abstract

The paper discusses pro and cons concerning the hypothesis of a distinctive European approach regarding its automotive system. Its aim is to develop an international comparison of the structural changes in the international automotive industry. A special focus is laid on the ways of coordinating competencies and knowledge. What are the differences that set the European industry apart from its North American and Japanese competitors in this regard? The paper discusses EU market characteristics and particularities of the European demand structures, the history of specific European approaches in the area of production systems and new forms of work and the recent changes of supplier relations since the 1990s. The analysis shows that the approach taken in the course of the restructuring of the supplier industry in Europe led to the development of specific capabilities related to cross company and interorganisational cooperation in the 1990s which partially explains the successful development of the European auto industry in recent time.

## Zusammenfassung

Das Paper diskutiert das Für und Wider der Hypothese eines besonderen europäischen Entwicklungsweges in der Automobilindustrie. Ziel ist, die gegenwärtigen Umstrukturierungen dieser Industrien mit einer international vergleichenden Perspektive zu erfassen. Im Zentrum steht die Frage nach der Koordination von Kompetenzen und Wissen: Welche Unterschiede lassen sich hier im Vergleich der europäischen Industrie mit der in Nordamerika und Japan feststellen? Die Untersuchung zeigt, dass insbesondere hinsichtlich der Reorganisation der Zulieferbeziehungen ein besonderer europäischer Ansatz entwickelt wurde, der zur Herausbildung spezifischer Formen der unternehmensübergreifenden und interorganisationalen Kooperation geführt hat. Die damit verbundenen Lernprozesse haben zu spezifisch europäischen Konzepten und Kompetenzen geführt, die wesentlich zu der relativ erfolgreichen Entwicklung des Automobilsektors in Europa in den vergangenen Jahren beigetragen haben.

# Contents

# 1. Introduction*

The European Car Industry has had a strong start into the new century. After three problem-ridden previous decades, this is somewhat surprising. Only ten years ago, the Japanese auto industry seemed invincible, the 1980s saw the French and Italian car industries on their knees, and in the 1990s the German car companies scrambled to regain competitiveness. By the year 2000, the Europeans seem to have re-invented themselves. They were the ones to open the new round of mergers & acquisitions. As a result, the US car industry is no longer the Big Three after the takeover of Chrysler by Daimler, and two of the Japanese Big Five now belong to alliances dominated by European car companies. Admittedly, it is not all roses within the European car industry. This is for instance indicated by the increasing difficulties of Fiat. In addition, the European resurgence may be owed to protectionist factors (such as the 10% tariff on cars imported to the EU versus 2.5% for passenger cars and 25% (!) for light trucks in the case of the USA and 0% in Japan[1]). However, some of the credit can be ascribed to good decision-making of European management and to differences in the approach the Europeans have taken vis-à-vis the restructuring of the automotive system. What might some of these differences be that set the European industry apart from its North American and Japanese rivals?

There certainly are characteristic features, which support the hypothesis of a European distinctiveness:

- institutional conditions, industry policies of the EU and its member states, industrial relation systems, tax policies, environmental regulations;
- the customer structure in terms of social characteristics, income, tastes reflecting for instance geographical particularities, structures of urbanisation;
- the industry structure in terms of OEM supplier, small and big company configurations.

On the other hand, a number of factors speak against the hypothesis of European distinctiveness:

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* This paper is based on research carried out at the Social Science Research Center Berlin (WZB) in the context of a research programme on Coordinating Competencies and Knowledge in the European Automobile System (CoCKEAS) between 2000 and 2002. The CoCKEAS Programme was part of the work activities of the international network of automotive industry researchers, GERPISA, and it was financed by the European Union in its framework 5 programme (cf. Lung 2001). I am very grateful for all comments made in the context of the CoCKEAS and GERPISA activities. I would like to thank in particular Paul Bailey, Bruce Belzowski, Michel Freyssenet, Yannick Lung, Glenn Mercer, Anne Posthuma, Mari Sako, Mario Salerno, Takahiro Fujimoto and Koichi Shimokawa for their thoughtful and productive comments on the previous versions of the paper. I would also like to thank Peter Jansen for his help in compiling this report. As usual, any errors and lacks of clarity remain the responsibility of the author. The paper will also be published in forthcoming issues of the Actes du GERPISA, and, in a shortened version, in the International Journal of Automotive Technology and Management.

1 Cf. Jama (2001: 24).

- For a long time now, American companies have had a strong presence in Europe. The Japanese automakers have followed, and since recently stepped up pace to increase production inside Europe.[2] Thus, today around 1/3 of the European automotive activities are being governed from outside. At least for the American manufacturers, however, it is also true that they have been part of the European automotive system for such a long time that their factories and practices in many respects more resemble those of their European competitors than their own organisation in the USA.
- Many of the paradigmatic concepts in the automotive industry are of Non-European origin. This is true for Fordism as well as Toyotism (lean production) and for all areas reaching from production organisation, to supplier relations and product development.

This paper discusses the pros and cons concerning the hypothesis of a distinctive European automotive system. The interest is not to develop a new (European) system. Rather the question is what is specific about the European system from an international perspective. Is there a specific approach to coordinating competencies and knowledge? If this is the case, which measures should be taken to foster trends, modify elements of the approach, provide supports and enable actors?

The term "automotive system" encompasses three types of actors: (1) upstream actors – suppliers of systems, modules and parts, resp. intellectual services (R&D, design, conception, industrial engineering); (2) central actors: the original equipment maker (OEM, i.e. the actual carmakers; and (3) the downstream actors: distribution, financial services, repair and after sales services. The automotive system is embedded in a system of institutions and shaped by regulations and policies on a national or supranational level.

Considering the size of Europe, or even of the European Union and the enormous differences between its countries and regions, treating Europe as a whole, certainly is a daunting assumption[3]. There are huge differences between the European countries, and the high degree of "diversity" can be seen as a distinct European characteristic. At the same time, Europe increasingly devel-

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2 The European production by Japanese Automakers increased from 100.000 units (1987) to 1 million units (2000) and half of the production is realized in the UK. (Jama 2001: 15) R&D centres are created in various member states of the European Union (Germany, UK, Spain, and France).

3 The European Union constitutes the economic core of Europe. With 370 Million inhabitants the "single market" constitutes the biggest market bloc in the world. It accounts for about a sixth of total global trade in goods (even excluding intra-community trade. This is more than its main partners and competitors, the United States and Japan. Free trade agreements (European Economic Area) promote and maintain trade links between the European Union and its neighbouring countries. Lastly there are free trade agreements with the central and east European countries – Poland, Hungary, the Czech and the Slovak Republics, Slovenia, Estonia, Latvia, Lithuania, Bulgaria and Romania (cf. European Commission 2002a: 8f.). When the EU enlargement is completed, about 170 Million new "consumers" will be integrated into the single market.

ops its own identity with distinct institutions, regulations and policies. Thus, one of the questions of the following is what influence European level policies have on the development of the automobile industry in Europe. Does a European automobile policy exist at all?

The structure of the paper is as follows: The next section (2) discusses the question of a European level automobile policy: is there such a policy, what objectives and points of emphasis does it have? Market characteristics and particularities of the European demand structures will be discussed briefly in section 3. Section 4 deals with alternative production systems, new forms of work and employee participation, i.e. areas in which Europe has sought to differentiate itself for a long time. Section 5 assesses changes in supplier relations since the 1990s, particularly the tendencies of specialisation related to outsourcing and modularization. Section 6 discusses implications of the new supplier structures for coordination and cooperation across company borders in the area of production, development and with regional networks of small and medium companies. Finally, some conclusions will be presented in section 7.

## 2. European Level Automobile Policy

It is only since the mid-1990s that one can speak of a coherent European-level automobile policy. In 1981, as a reaction to the oil crisis, the European Commission formulated its first statement on the European automobile industry expressing the need for a closer cooperation in the industry, of increased investments, the stimulation of R&D and a policy, which favours the structurally weak areas in Europe. In particular, regarding the R&D efforts, the Commission urged a closer cooperation between the European companies signalling its interest to develop a specific European automotive system.

During the 1980s, the main focus of the Commission was on state aid provided to the national industry in order to cope with the increased competition and the impact of the oil crisis. Between 1977 and 1987, member states granted an estimated amount of 26bn ECU to the EC motor vehicle producers (Dancet/ Rosenstock 1995: 2). In 1988, the Commission published a memorandum, which for the first time set a policy framework on the issue of state aid for the automotive sector.

In view of the 1992 deadline for the completion of the single market and the perceived lack of competitiveness vis-à-vis the Japanese competition, the next major focus of the EU was on European competitiveness. An action paper of the European Commission addressed the external (the “volet externe”) and the internal (“volet interne”) dimension of the competitiveness issue. The volet externe was implemented via the voluntary agreement (“elements of consensus”) between MITI and the EC in 1991 regulating a gradual opening up of the European market to Japanese imports until 1999 and providing green light for Japanese transplants (up to 1.2 million cars). The volet interne was specified in the 1992 sector plan for the industry.

In the meantime, in 1991, the industry itself finally had settled its internal differences regarding its EU-level industry representation. In this year, the Association des Constructeurs Européennes d’Automobile (ACEA) was established, which now represents all European carmakers including the American manufacturers operating in Europe.

In 1995 the Commission ordered a comprehensive review of the sectoral framework.[4]

In its strategy paper on the automotive industry (cf. EU Bulletin 7/8-1996) the Commission stated its intent to create an appropriate framework for the improvement of the competitiveness of the European car industry by:

- supporting R&D and training measures (a research programme on the “car of tomorrow”, the role of the car in a multi modal traffic system, the support of applications for electronic data transmission, the programme of occupational training, etc.;

4 At this point, a major policy concern was the distribution system based on the block exemption stated by the European Union ten years ago. In a modified form, the block exemption was prolonged until 2002.

- strengthening the European motor vehicle industry's market presence vis-à-vis third countries;
- type approval of motor vehicles and their components;
- modernising the regulatory framework in the areas of taxation, safety and emissions;
- setting up a "dialogue group" of representatives of the manufacturers, suppliers, trade unions, users and European institutions (European Commission 1997).

**Figure 1: Milestones in the development of an EU automobile policy**

| Year | Policy Statement | Goals |
|---|---|---|
| 1981/83 | "Commission Statement" on the European Automobile Industry + action paper | • Closer cooperation in the industry (especially R&D)<br>• improving the productivity<br>• control of state aid |
| 1988/90 | Memorandum of the Commission + new action plan | Volet interne:<br>• Framework for state aid<br>• Improving competitiveness<br>• Strict control of state aid<br>• Increase of R&D activities<br>• Foster social dialogue<br>Volet externe:<br>• Restrict imports from Japan and Japanese transplants into Europe |
| 1995 | Task force "Car of tomorrow" | • Research co-operation between European companies<br>• Focus on clean cars/electrically powered cars (city of tomorrow) |
| 2002 | New regulation on car distribution (block exemption) | • Increase inter-brand competition in Europe<br>• Level out price differences between European countries, increased competition in car distribution |

In 1995, the Commission had installed a taskforce for the "car of tomorrow". A specific concern of the Commission was to foster inter-European research co-operation. In a resolution from 1997, the European Parliament urged the Commission to extend the role of this task force to a strategic function dealing with problems of industry competitiveness as well as with environmental and safety issues. The Parliament stressed that the Commission should pay more attention to social aspects, particularly the need for an increase in vocational training, more information and consultation of employees as well as protection against mass dismissals (EU Bulletin 3-1997). The European Council for Automotive R&D (EUCAR), an industry consortium, representing the research and devel-

opment organisations of automotive manufacturers in Europe was established as part of ACEA in 1994. Two years earlier, in 1992, USCAR had been formed for pre-competitive research collaboration between the Big Three in the USA. While USCAR and the related partnership for a new generation of vehicles (PNGV, an industry-government research and development alliance established in 1993, succeeded by FreedomCAR in 2002) clearly focussed on new product technologies, EUCAR recently developed a broader approach.[5] Thus, in view of the sixth EU R&D framework programme EUCAR recently came out with a proposal on "road transport research" focussing on the three dimensions of environment, energy resources; safety for road users; and mobility and transport.[6]

Summarising on the point of the existence of a European automobile policy, we follow McLaughlin and Maloney (1999: 202) in their conclusion on European automobile industry governance: "We would argue strongly that the EU does have an industrial policy for automobiles. Its central pillars are the state aid framework, technical harmonisation and the removal of tariff barriers to the EU markets." However, the authors also stress that the EU policies "have promoted internationalisation rather than Europeanization. The Commission has attempted to expose European national champions to greater global competition." (ibid.)

Thus, the EU policy mostly had a neo-liberal agenda: reducing state subsidies and opening up the European markets. This was accompanied by the support of R&D projects of the industry and measures regarding social and labour aspects. Those who advocated a more active industry policy, however, remained critical of this policy:

> "ACEA has, on several occasions, urged the Commission to pursue a 'managed trade' strategy and to learn the lessons of the Japanese Ministry of international trade's success with industrial policy initiatives. Those academic commentators who are highly critical of the Commission's *laissez-faire* approach to industrial policy have been equally scathing. Williams et al. (1994: 184) argue that the *volet interne* for automobiles amounts to little more than 'few high-tech projects and some noises about training'. This is not far from the reality of the situation. There is, of course, a difference between the strategy that is deliberately minimalist and not having a strategy at all." (McLaughlin/Maloney 1999: 202)

In any case, there does not exist a dedicated "automobile pot" (ibid.: 194) of money to support the industry. The sector policy orientation has been deemphasized by the EU in recent years.[7] The automotive industry, however, has

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5 A comparative review of pre-competitive innovation activities in the USA, Europe and Japan in the case of research on batteries for electric cars and hybrid cars is presented by Larrue (2002).

6 The General Report on the Activities of the European Union 1997: "the Commission, for its part, proposed a key action on the city of tomorrow aimed at developing the technologies needed to produce and use fuel-efficient, clean, safe and intelligent vehicles in urban areas" (European Commission 1997a).

7 Thus, the ninth survey on state aid in the European Union stated in 2001: "There are no aid schemes in the EU that are specific to the sub-sector of the motor vehicle industry. State aid is approved to the sector mainly by way of regional rescue and restructuring and training aid" (European Commission 2001: 40).

always been a major “customer” of the various general support programmes of the EU in the areas of training (FORCE, LEONARDO etc.) and the various framework programmes for research and technological development (RTD) from 1984 onwards.

In assessing the impact of the EU level policies, it is important also to take into account the aspects related to the “social dimension” of the EU and measures in the area of labour and industrial relations.

The European works councils (EWC) are considered the most striking example[8] of a policy orientation seeking to balance interests between capital and labour and between plants in different regions of the EU. EWC “help to foster exchanges of views and discussions which are essential for the development of multinational understanding of industrial relations. In years to come, these Euro work councils could provide the proper forum for addressing issues such as mobility, transferability of rights and equal opportunities” (European Commission 2000b: 6). The EWC constitute a supplementary institution for the representation of the workers interest. They do not replace already existing elected bodies in the member states. Their competencies remain rather low, they are limited to information and consultation, and only in recent agreements (signed after 1997) has the need for a timely provision of information and consultation been stipulated in the texts.[9]

More than 1,200 companies operating in Europe (15 million employees) are covered by the legislation. About 500 companies had reached EWC agreements by early 1999. By the early 1990s, most of them were concluded on a voluntary basis. Voluntary EWC agreements – with less binding obligations – remain in force, even if they do not fully meet the conditions set by the European Directive.

Extending the idea of a Europe-wide works council system, a few companies, e.g. the Volkswagen AG, have established world works councils on a voluntary basis. Carrying this development a step forward a first global code of conduct (Declaration on Social Rights and Industrial Relationships at Volkswagen, of June 2002) was signed between Volkswagen, the new VW world works council and the International Metal Workers’ Federation (IMF). The VW-IMF code is largely based on ILO core labour standards.

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8 Already in the early 1970s labour law directives made it compulsory to inform and consult employees about major economic upheavals. In 1994 a council Directive made it obligatory to inform and to consult employees within European groups employing more than 1000 people.

9 This was due to the conflict about the closure of the Renault plant in Villevorde (Belgium). The EWC of Renault was informed after the decision had been made and was consulted on the consequences of the decision only. cf. the detailed analysis of negotiations on the introduction of EWC, undertaken by the European Foundation for the Improvement of Living and Working Conditions (2000: 5).

The social dialogue at the supranational European level is the counterpart of the EWC. A voluntary bipartite dialogue process[10] is currently being developed in 24 sectors. The aim of the initial dialogue is to identify relevant problem areas for the social dialogue and to develop a common "vocabulary". This explains why, at the present stage, commitments resulting from the sectoral social dialogue are still thin on the ground.

The bipartite dialogue between the Union of Industrial and Employers' Confederations of Europe (UNICE) and the European Trade Union Confederation (ETUC) also called "Val Duchesse" social dialogue was adopted in 1985 by the UNICE, CEEP (Centre Europeén des Entreprises a Participation Publique) and the ETUC. The role of the social partners was later recognized in the Treaty of Maastricht (Articles 138 and 139). The social partners can explore and discuss key issues (economic policies, completion of the Internal Market, implementation of the Social Charter of the Fundamental Rights of Workers). In 1991, the agreement between the social partners served as a basis for drawing up the new treaty articles stipulating the role of the social partners at the European level. The new provisions came into force in 1993. "The social partners' right to be consulted on proposals in the social field and to opt for agreement-based rather than legislative measures now makes them central players in the European social arena. The 'joint opinions' period has thus gradually given way to the negotiation of European framework agreements[11]" (European Commission 2000b: 8).

In 1997, the European Council (Job Summit in Luxembourg) established a study group to analyze industrial changes in the European Union. In its final report, the group concludes that industrial restructuring will be an increasingly important topic for social dialogue in each sector. The social dialogue has to be developed as an "in-house social dialogue", based on information and consultation of the workers representatives. "The systemic development of social dialogue within companies, nationally and at the European Union level is fundamental for managing change and preventing negative social consequences and deterioration of the social fabric. Social dialogue ensures a balance is maintained between corporate flexibility and workers' safety." (European Commission 1998: 9)

A trend towards common policies, however, should not be confused with a trend towards the establishment of a common system of industrial relations. The EU-Report on industrial relations states very clearly: "Practices governing the framework of dialogue, the outcome of collective bargaining, the conditions for collective action and the arrangements for resolving conflicts are, however, still determined at national level. European law is not applicable to such matters,

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10 The cross-industry social dialogue is based on the idea of tripartite concertation. Tripartite concertation was already strengthened in the 1970s (Standing Committee on Employment).

11 Three agreements have been signed since 1995: parental leave (December 1995), part-time employment (June 1997) and fixed term employment contracts (March 1999).

which are underpinned by strong national traditions." (European Commission 2000b: 9)

The goal of preventing negative social consequences of industrial change can also be clearly seen in the statements of the Commission concerning the organisation of work. The support of human oriented work systems has been an important element of all RTD framework programmes. Thus, the FAST-Research Program (FAST stands for "Forecasting and Assessment in Science and Technology"), set up by the European Commission in 1992, promoted the idea of an "anthropocentric production system". It is considered as an advanced manufacturing system, which depends on the balanced integration of human skills, collaborative work organization, and adapted technologies (FAST-Monitor 1992).

On the development of production systems, the year 2000 Report on Government Support Programmes for New Forms of Work Organisation states: "Major changes are taking place in the way in which work is organized within companies. They are based on the new model of 'high trust',[12] 'high skill', and extensive employee involvement in decision making." Recent changes in the regulations governing the European Social Fund give member states an opportunity to use funds in new ways, including the provision of support for the introduction of new forms of work (European Commission 2000c: 2).

Designing the next steps, the Report on Government Support Programmes recommends that the programs should foster the introduction of holistic "high performance work systems" and the introduction of new performance measurement and reward systems (European Commission 2000c: 5). According to this report, high-performance work organization encompasses new organizational structures (market and process orientated business units and semi-autonomous work teams); more flexible and less hierarchical working methods (flexible working hours, multi-skilling and job rotation); new business practices (quality management, continuous improvement), new corporate cultures (high-trust relations, increased participation, greater personal autonomy and accountability); increased investment in education and training; new performance measurement techniques and new reward systems (performance orientation, bonuses, profit sharing).

In a very optimistic interpretation, the report on New Forms of Work Organization concludes: "New Forms of Work Organisation have created a new paradigm. Based on unlocking the creativity and commitment of workers through an environment of 'high trust' and 'high skill', high-performance work practices provide workers with opportunities to control their work, to develop wider skills, and to take responsibility for a wide range of tasks. There are, however, concerns that such practices might increase stress and erode traditional skills. There are

12 The importance of the high trust relationship and education can be found in nearly all European reports on modernization and industrial relations systems. The Managing Change Report (European Commission 1998: 5) argues that companies "should realize that investment in people is profitable and that trust between employees and employers is a prerequisite for success."

also uncertainties about the impact new forms of work organization may have on traditional relationships between unions, workers, and managers." (European Commission 2000c: 13).

With reference to the Green Paper "Partnership for a New Organization of Work" (European Commission 1996) the main tendencies supported by the European Union can be summarized as follows.

- Europe needs to foster high skills and promote high quality in the workplace in order to improve productivity and create the conditions for employment and productivity.
- Europe needs to introduce new forms of work organization in all sectors.
- Europe needs to speed up the process of modernizing work organization.
- Europe needs to pay more attention to the gender perspective, including the reconciliation of working and family life.

Summarizing, we can indeed observe a distinct European concern to align industrial policy aiming to increase competitiveness and foster ecological goals with elements of a social policy, aiming to increase social cohesion, social dialogue, and a human oriented system of work with worker participation, a high emphasis on skills and trust relationship. There is nothing equivalent to this approach in the other two regions of the triad. One may argue that this social element of the equation is too weak and mostly symbolical. It certainly has not prevented "unsocial" measures such as relocation of plants following cost differences within the EU, as Castillo and López Calle have shown in their case study on component suppliers to Volkswagen-Navarra (Castillo / López Calle 2002). In addition, the reality in many cases is different from EC discourse and the high-flying goals proclaimed in various documents. One has to note, however, that there has been no comparable move towards the "low road" development model (seeking advantages of low cost production sites, as in the case of USA – Mexico (cf. Cooke et al. 2001) in Europe so far.[13] The European Works council provides a platform to co-ordinate interests and prevents whipsawing between plants within the transnational production system of companies. In this sense, a recent report on industrial relations and change states: "Industrial relations can make an important contribution to good governance and push forward the European strategy, fostering modernization based on a new social contract, exploring new ways to strengthen competitiveness with social cohesion, creating better prospects for employment and improving living and working conditions". (European Commission 2002b)

13 However, the enlargement of the European Union will include a number of countries with wage levels around of € 300 per month, as opposed to more than € 2000 in many of the current EU Member states. According to the IUF, the gross social product of the ten accession countries taken together represents no more than that of the Netherlands. The great gap in social and economic development in Europe is considered a threat (www.inf.org/iuf/CEE/03.htm).

## 3. Market Characteristics

Customer preferences and market structures differ widely between the European countries and regions. This can be explained by differences of taste, culture, social and geographic characteristics as well as by different socio-economic conditions. (cf. Williams 2002, 13). The EU goal of achieving socio-economic harmonization between the European countries is still far from being realized even if we leave out the situation of the new entrants from Middle and Eastern Europe. The average purchasing power (table 1), indicates that there are deep socio-economic disparities in particular between the Northern and the Southern European countries.

**Table 1: Average Standard Purchasing Power (equivalent net income p. a.) in the EU 15 countries 1996**

| EU-15 | B | DK | D | EL | E | F | IRL | I | L | NL | A | P | FIN | S | UK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12,316 | 13,857 | 14,043 | 14,052 | 8,400 | 9,102 | 13,496 | 10,949 | 10,101 | 21,992 | 13,414 | 14,377 | 7,722 | - | - | 13,721 |

Source: eurostat/European Commission (2001, Anhang II, p. 120)

Europe (EU member states and the Central and Eastern European Candidates) can be considered as a "semi-integrated market" if one takes into account the following dimensions (cf. Lung 2002: 2):

- Products (vehicles, product range, and components) are quite homogenous: small cars and lower middle range cars represent in the European average 60% of the EU-market.
- The institutional supervisory framework throughout the EU-market is harmonized and coordinated by the European Commission (technical and environmental norms, distribution regulations, competition policy).

Intra-European heterogeneities are very small when compared with the differences between the European market and the world's two other major industrialized markets.

In view of the question of European distinctiveness, three particularities shall be addressed in the following: The high degree of brand loyalty in Europe (at least when compared to North America), the sports car and racing car tradition, and the importance of the Diesel market.

(1) A fundamental difference between the North American and EU market in terms of customers is the number of cars per household. The average American new-car buyer is actually a "fleet manager", adding and subtracting cars from the roughly 2.5 vehicles per household. In Europe one is much more likely to own the one car. It seems plausible that brand loyalty is greater when one is replacing the one vehicle every five years or so, versus the American model of updating a unit within the fleet every two years or so. At least one is more emotionally invested and thus less price-sensitive if one just has the one vehicle.

A further evidence of brand loyalty is given by the fact that the Japanese share is highest in countries with no local auto industry to which consumers have developed loyalty, i.e. Denmark, Belgium, The Netherlands, Norway, etc.[14]

It is not clear to what extent changes in the distribution system (block exemption[15]) will affect these factors. In any case, there seem to be marketing barriers to Japan and North America, which have helped the EU to resurge.

(2) Sports and racing cars together with luxury cars have always been a European field of specialisation. While the enthusiasm for these cars is not Europe-specific, Europe has remained the lead market for performance-oriented customers meaning that technological improvements in the upper ranges diffuses more quickly into the other car categories. Europe also remained the world centre in the design and assembly of sports cars (cf. Pinch et al. 1997; Henry and Pinch 2000). We shall return to this issue later.

**Table 2: Share of Car and Engine Types of Total Market**

| | Light Trucks | Diesel | Mini car |
|---|---|---|---|
| **NA** | 50% | < 1% | < 1% |
| **EU incl. EFTA** | 10% | 43% | 7%* |
| **Japan** | 15** | 16% | 30%*** |

* Newly registered passenger cars below 999 cc on the German market 2000; cf. Lung 2002: EU Market: Small car B ca. 27%!
** Own estimate
*** Below 660 cc

Based on ACEA 2002. New Passenger Car & Light Commercial vehicle (<5 t), Breakdown by specifications in: www.acea.be; VDA 2001, Tatsachen und Zahlen, 65. Folge, 164; JAMA (2001): The Motor Industry of Japan, in: www.jama.or.jp/14_english/index.html.

(3) Regulation has helped to shape and deepen consumer preferences, and this is true for all three triad markets. In the course of the 1990s, there has been a clear tendency of divergence between the three main world regional markets. In

14 Three different country types have to be distinguished in Europe: Countries with own brands, countries without own brands, but with car or parts manufacturing and countries without brands and car-related manufacturing. The three types correspond with very different strategies of marketing and pricing.

15 Buzzavo/Volpato (2001) and Stochetti/Volpato (2001) provide data on the evolution of the car distribution system in Europe, the U.S. and Japan and underpin the consequences of the shift from sellers markets towards buyers markets on the whole value chain. (cf. Volpato/Stochetti 2002). Buzzavo/Volpato (2001: 10) summarize the key principles of the European, U.S. and Japanese distribution systems. One key peculiar aspect of the European systems is described as follows: “European manufacturers can oblige dealers to refuse sales to unauthorized resellers.” The Commission in the meantime has revised the regulation on bloc exemptions aiming at the improvement of inter-brand competition.

Japan, it is the rise of the mini cars (cars below 660 cc) which have doubled their market share from below 16% in 1990 to over 30%; cars of below 2,000 cc made up 82% of the Japanese market in 2000.

In North America, it is the story of light trucks, which make up about 50% of the total market today from around 30% in 1990.

In Europe, it is the Diesel story. The share of Diesel-engine cars increased from 19% to 42% between 1990 and 2001 while in Japan, and in the USA, it is virtual nil.

Thus, the differences between the triad markets have deepened in the course of the 1990s and the trend of divergence seems to continue.

Summarizing: Market structures, in particular since recently the “carving out” of the European market segment of Diesel-powered cars has contributed to the European resurgence considerably. Government regulation and the co-ordination of competencies and knowledge via research support programmes have played a crucial role as the Diesel experience has shown (cf. Diesel Technology Forum 2001).

## 4. The Quest for an Alternative "European" Production System

This is an area where European agents have made numerous attempts towards developing a European approach (cf. Jürgens 1997). Since the days of George Friedman, the critique of Taylorism was the common denominator. The Tavistock Institute, the socio-technical systems approach, the industrial democracy and humanisation of work programmes carried out in various combinations of partnerships between employers, trade unions and the state could be listed here. Beginning with the New Factories Movement (Agurén/Edgren 1980) in Sweden, alternative forms of production organisation were implemented in the car industry since the 1970s, in particular the 1980s. The various approaches and their development have been described in detail in the literature.

In the following, a closer look at the specific approach developed in Sweden, which clearly played an avant-garde role in this field, shall be taken: The "Swedish Revolution" (Agureén /Edgren 1980: 7) was mostly driven by labour market concerns. High absenteeism, labour turnover, and difficulties in recruiting new workers became the driving forces for the development of an alternative work organization to make industrial work more attractive (Sandberg, 1995: 89). Volvo became the forerunner in a process of an organizational development focusing on the use of "human resources", leading to the most advanced forms of departure from the Fordist-Taylorist paradigm.

The Volvo experiences prove that significant work reforms require a specific process layout based on an assembly-oriented product structure (cf. Engström/ Medbo 2001). The central elements of the Uddevalla system combine a different production layout with a specific type of teamwork[16]. The resulting patterns of the production system are based on four central principles:

(1) stationary assembly – work is no longer paced by the assembly line (time sovereignty);
(2) holistic work cycles for the group (complete assembly of a car), based on a coherent connection of single tasks;
(3) long individual work cycles (goal: two hours after the completion of training);
(4) a "representative workforce" with a composition reflecting age and gender of the general working population.[17]

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16 Crucial for understanding the Uddevalla production system – called "reflective production system" by its academic support team (Ellegård 1996) – was a synthesis of learning theory and material handling which was essential to achieve the long-cycle time assembly work. This concept emerged from experiments of disassembling components, which were then reconfigured under criteria of ease of assembly and ease of memorizing (cognitive mapping) by the assembly workers. On this basis a "kitting" method was developed which turned the actual placement of materials on the transport racks into assembling guidelines.

17 Thus the aim was to have around 25% of employees below the age of 25, 50% between 25 and 45 years and 25% older than 45 years; the goal also was to have around 40% female employees. In practice these goals were only partially real-

Against all odds, long-cycle work was mastered by the workforce up to the levels set by the planners (minimum two hours) and many workers aimed at achieving the "complete car builder" certificate (Engström et al. 1996).

The Swedish work reforms triggered a wide debate in European countries. They constituted a reference for national experiments in many companies. However, European carmakers were not inclined to adopt the "Volvo Model" as a whole. Comparing the small production output of Volvo with the production volume of Fiat, Renault, and Volkswagen, the management of "mass producers" reached the conclusion that the "Volvo-Model" does not constitute a viable alternative to the assembly line and its competitive advantages based on large-series production. German companies operating in the premium price segment (Mercedes, BMW) took a slightly different position.

However, in view of the broadening protest movement against working conditions in mass production and, in some European countries, due to state support – such as the German "Humanization of Work" (HdA) programme[18] (cf. Badham/Naschold 1994) or the activities of ANACT (Agence nationale pour l'amélioration des conditions de travail) in France – many companies began to adopt at least some elements of the Swedish work concepts. This led to various experiments with new forms of work – long work cycles, decoupling from the pressure of the assembly line, enrichment of jobs, team work etc. – in the 1980s.

However, the "Swedish turn" of the production system debate was of short duration. At the beginning of the 1990s, a shift into different directions took place. The Swedish-oriented alternative required far-reaching changes in the technical production structures, in particular a shift from the assembly line to a stationary assembly. A completely new process layout like at Uddevalla was not adopted by any of the European carmakers however. Nevertheless, even the more modest versions of a Swedish-oriented approach such as stationary assembly of certain modules or the hybrid process layout of the Mercedes-Benz plant at Rastatt did not survive the U-turn. Pilot experiences were soon scaled back or scrapped altogether. Figure 2 shows this rollback and the return to

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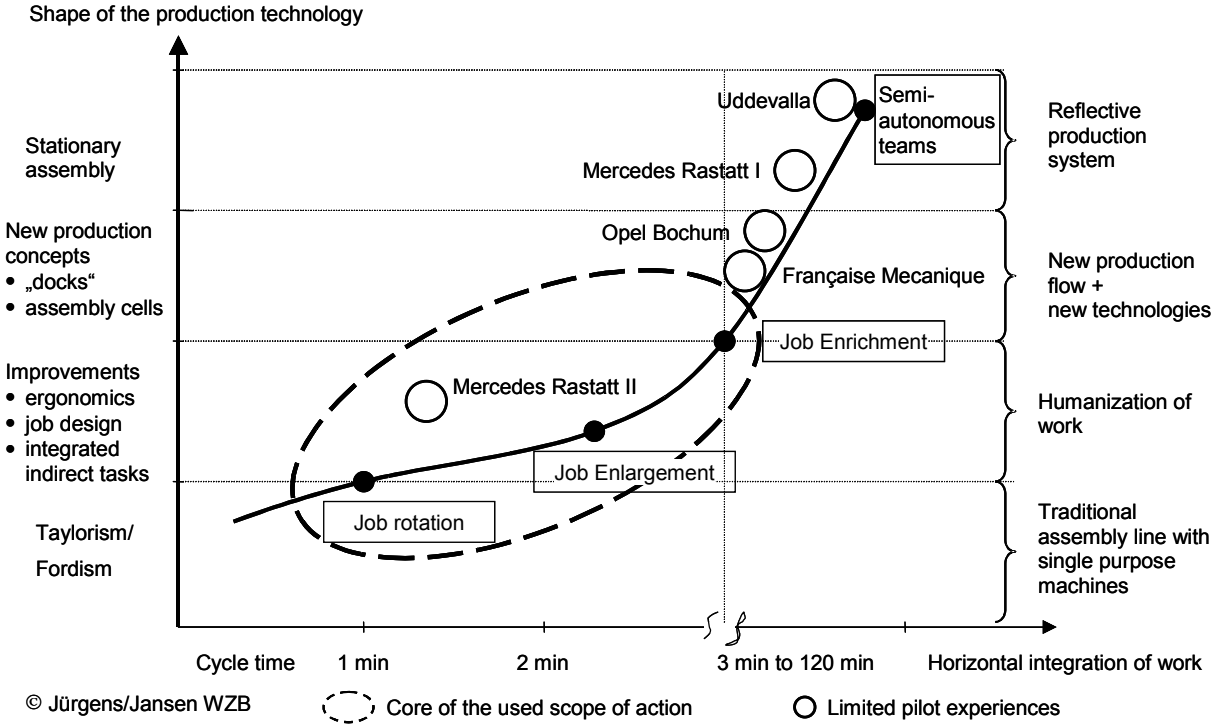
ized. In 1993 28% of assembly workers were women; 54% were under 32 years old.

18 The majority of projects supported by the HDA Program was on measures to improve work-related strain and stress, ergonomic issues such as overhead work, heavy lifting etc. Greifenstein/Kißler (1994: 15) state that from 1974 to 1994 only 33 research projects of the Program dealt with "group work". 10 of them took place in the car industry. In spite of the low number, these experiments have had a high impact on the discussion. The most advanced experiments were concerned with subassembly areas (doors, instrument panel, wiring harness system etc.). Usually the modules taken off the mainline would encompass those operations where the model mix had caused most problems in terms of differing labour content and line balancing. However, essential Uddevalla innovations were not implemented. Neither was the assembly line abolished altogether, nor were work organization and qualification systems introduced aiming at small work groups building complete cars (Jürgens 1995: 208).

more conventional solutions. The refurbishment of the Rastatt plant of Mercedes-Benz is a very good example of this trend (Jürgens 1997).

**Figure 2: Toward A European Model of Work Organization: From Taylorism to Uddevalla (and Retour)**




As a résumé of the European activities, it must be concluded that EU policy has had little impact on production systems and industrial relations systems in Europe so far. One driving force for work reforms in the late 60s and the 70s – tight labour markets and thus the need to make industrial work more attractive for workers – did not exist any longer. In contrast, in Japan, the labour shortage led to a disdain there for 'dirty' industry jobs. Nissan and Toyota responded by developing a "people-friendly" plant design for their new plants in Kyushu in the early 1990s (cf. Shimizu 1999). This driving force has disappeared in Europe as well as in Japan in the meantime. Demographic development indicates a lack of young workers and a dramatically ageing workforce for the future. Nevertheless, since the 1990s, the lean production/Toyota production system clearly has become, or remained, the dominating paradigm, in terms of philosophy if not practice.

However, a strong orientation towards concepts of "good work" or "decent work" which had been developed in the course of the debate about new forms of work is still 'alive and kicking', in particular within the labour unions in some countries. A recent example is the concept of "The rewarding work organisation"© (ReWO©) which was developed as an evaluation tool for work planning for the Swedish Trade Union Confederation (cf. Bergström 2000). The term "decent work" has been introduced by the International Labour Organisation (ILO) to

address policy concerns over rights at work, employment opportunities and working conditions in the context of the new policy framework (Egger 2002). Another example is the 5000x5000 project now being realised at the Volkswagen Wolfsburg site. The agreement struck between Volkswagen and the IG Metall on August 28, 2001, contains regulations on work design. Under "Goals", it is emphasized that:

> "Each employee has the right of a human-oriented work design. (…) Work organisation has to be designed in such a way that employees will neither be over- or undertaxed, that they will be charged with diversified and holistic tasks which correspond with and which require further development of their knowledge and abilities." (Translation U. J.)

It remains to be seen how these goals will be implemented in practice. The greatest impact of the alternative design movement probably was in the area of small and medium sized companies which to a large extent have introduced cellular production concepts in their manufacturing and assembly areas. Cellular layout and teamwork have become widespread and seem to be non-controversial in practice there.

Overall, it must be said that the general impact of the alternative work design movement on operations management in European plants remained limited.[19]In an unplanned way, however, a link exists between the "new production concepts" and modularisation. And as "modularisation" is a strong candidate for European distinctiveness in the present discussion, these concepts are very pertinent to our topic.

Modularisation concepts came up in the late 1970s/early 80s. They were a European particularity at first, even though the basic idea was developed much earlier in other industry contexts (cf. Starr 1965). In the late 1970s, early 1980s, almost every European carmaker experimented with some kind of alternative to the assembly line by installing "modular areas" off the main line, called production cells, assembly islands etc. These modularisation approaches were production-oriented, and driven by increasing product complexities or by automation projects. While some companies developed modular areas mostly in assembly plants by setting up stationary production areas ("islands") for the assembly of doors, cockpits, seats etc. aiming at the improvement of working conditions (longer cycle times, job enrichment), other companies were more interested in designing a process which allowed a maximum degree of automation. A prominent example for the latter was Volkswagen's assembly plant in Wolfsburg established for the production of its high-volume product, the Golf in the early 1980s. The new process layout required a new product architecture. Consequently, a new design for the front end of the car was developed and along with this a concept of the front end module. This module was built on a subassembly line at the Wolfsburg plant at that time. A decade later, the "front end" was one of the first modules to be assembled (while still developed by VW) by a supplier firm (Hella) at VW's new assembly plant in Mosel, East Germany.

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19 Indicators do point towards convergent technical production systems operating with divergent social systems (with its implications on: work organization, wage/income; cf. Clarke/Gijsel/Janssen 2000).

The assembly islands for stationary production of cockpits, doors etc. established by many carmakers in the 1980s have all been scrapped in the meantime. However, the carmakers did not integrate these operations into their assembly operations again. After having been defined as separate modules, they became a major business for suppliers in the 1990s.

This leads us to supplier relations as an important area of European distinctiveness.

# 5. Europe's Supplier Structure and the Direction of Its Restructuring

The restructuring of the 1990s made the European supplier landscape a particular hot spot. This for two reasons: Firstly, many of the existing companies were too small in terms of new product development capacity, global plant coverage, and access to capital markets. Requirements of OEMs regarding modularisation and globalisation could not be met under these conditions. Secondly, with the Big Three US companies, as well as PSA and Fiat in Europe, spinning off their internal supplier base, these companies aggressively acquired European firms to gain access to OEMs and to specific technologies. Other American companies, most of them publicly listed, followed taking advantage of the favourable stock-market conditions in the USA.

Therefore, the traditional structure had come under strong pressures for change – a situation that required and allowed new solutions (on the driving forces and directions of the restructuring of OEM-supplier relationships cf. Volpato 2002). To what extent has this led to a distinctive European approach? The following three developments are of specific interest in this regard: Firstly, modularisation and systems-supply capabilities; secondly, supplier parks and OEM/supplier plant consortiums, and thirdly the formation of regional networks ("clusters") of SME.

## 5.1 Strategies towards Modularisation

In the meantime, the production of modules such as cockpits, doors etc. at the OEM plants mentioned above has become a major business for suppliers. Facilitating this transition was one of the major functions of the crisis of the early 1990s. The division of the supplier industry into tiers – the reduction in the number of direct OEM suppliers following the Japanese example – received a particular thrust under these conditions: The suppliers of systems and modules would be the natural candidates for first-tier suppliers receiving sub-modules and components from the second-tier suppliers and they in turn buy their parts from third-tier suppliers and so on. Defining the modules[20] in view of the various requirements (cf. Takeishi/Fujimoto 2001), and aligning the different needs and viewpoints of design, manufacturing, logistics and after-sales services[21] required an enormous engineering effort on the side of the OEMs, and on the side of the suppliers which wanted this business. In addition, enormous efforts were necessary to acquire the engineering capabilities.

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20 The term "module" is not clearly defined and therefore used by suppliers in a loose sense. There is no unique definition for modules, systems, core competencies and strategic competencies (cf. Toyota definitions page 4 in Chanaron 2001).

21 For this reason, Sako and Fixson stress the need for compromise between the different actors involved: "… 'Modularity' really encompasses a bundle of product characteristics and different constituencies place different weights on them" (Sako/Fixson 2001: 8).

European carmakers were the first to make these efforts and urge suppliers to join them in developing the modular concepts. They found American suppliers and particular the spin offs of the Big Three to be very eager to pursue this new business strategy. The Big Three adopted the modular approach early on in their planning for new factories in South America. For their North American operation, however, it took longer to implement them. The Japanese carmakers have been much more reluctant in adopting modular concepts (cf. Takeishi/Fujimoto 2001; Ikeda/Nakagawa 2002).

Thus, the structural change in the automotive supply has been greatest in Europe. According to a study of a German consultant group, modules and systems made up 22% of the total automotive supply for European carmakers in 1993; components made up 57%; standard parts 13% and raw materials 8%. Until 2000, the forecast expects the share of modules and systems to increase up to 43%; the share of components to decrease to 42%; the share of standard parts are expected to make up 8% and the share of raw materials 7% of the total supply value (Wolters 1995).

The trend toward modules and systems provides strong support to the trend towards “mega-suppliers”. Only a small number of players worldwide can provide the capabilities required. According to the German consulting group Roland Berger, consolidation in the industry had led to oligopolies of seven to eight top suppliers per module and system in 2000 already. For 2005, the consultants forecast a reduction of this number per module and system to five to six, and for 2010 to three to five. At the same time, the number of modules and systems per vehicle decline with a further integration of parts and functions into larger modules resp. systems. While there were 18 to 20 modules and systems per vehicle in 2000, Roland Berger forecasts a reduction to 14 to 16 by 2005 and to around ten by 2010 (Roland Berger & Berger 1997).

In an international comparative perspective, two different strategies of modularization can be discerned (cf. Chanaron 2001):

The Japanese OEMs, in particular Toyota and Honda, prefer functional modules and emphasize the optimization of total vehicle design. Outsourcing is only one of the available methods to reach such goals. Both companies do not see the benefits of charging their suppliers with larger responsibilities in the sense of the modularization approach. They rather seek to retain basic competencies in all strategic areas and the control over the value chain. Some of the Western companies also tried to retain comprehensive competences in all strategic areas resp. gain competences in new technology areas such as electronics. (cf. figure 3)

This contrasts with other European and American OEMs which – aiming to focus on core competencies – have increased the responsibilities of first tier suppliers even if this meant the loss of competencies in these areas. They also require suppliers to take the responsibility for new product development as well as for purchasing and organising the supply chains of their products.

**Figure 3: Two strategic alternatives**

| Core competence approach | Total competence approach |
|---|---|
| Specialization on a number of core competencies | Retention of basic competencies in all strategic areas |
| Delegation of responsibilities to first tier suppliers also in areas of quality control and design | Maintain the responsibilities for quality control and design |
| Decentralized management of the value chain | Central control of the value chain |
| Electronics/IT parts/knowledge transferred from external suppliers | Internal development of critical electronics/IT competence |
| Cautious and step-by-step approach to technological innovation | Leadership through innovation: hybrid vehicles and on-board navigation systems |

Source: Based on Chanaron (2001: 3) with modifications by U. J.

The European and American OEMs put their priority on requirements related to assembly operations and global coherence for their multi-plant operations. They stress cost reduction through externalization of tasks to suppliers and through focusing their own resource allocation on a limited number of core competencies. Suppliers should have R&D and innovation capabilities: "therefore, they are large and global corporations." (Chanaron 2001: 14)

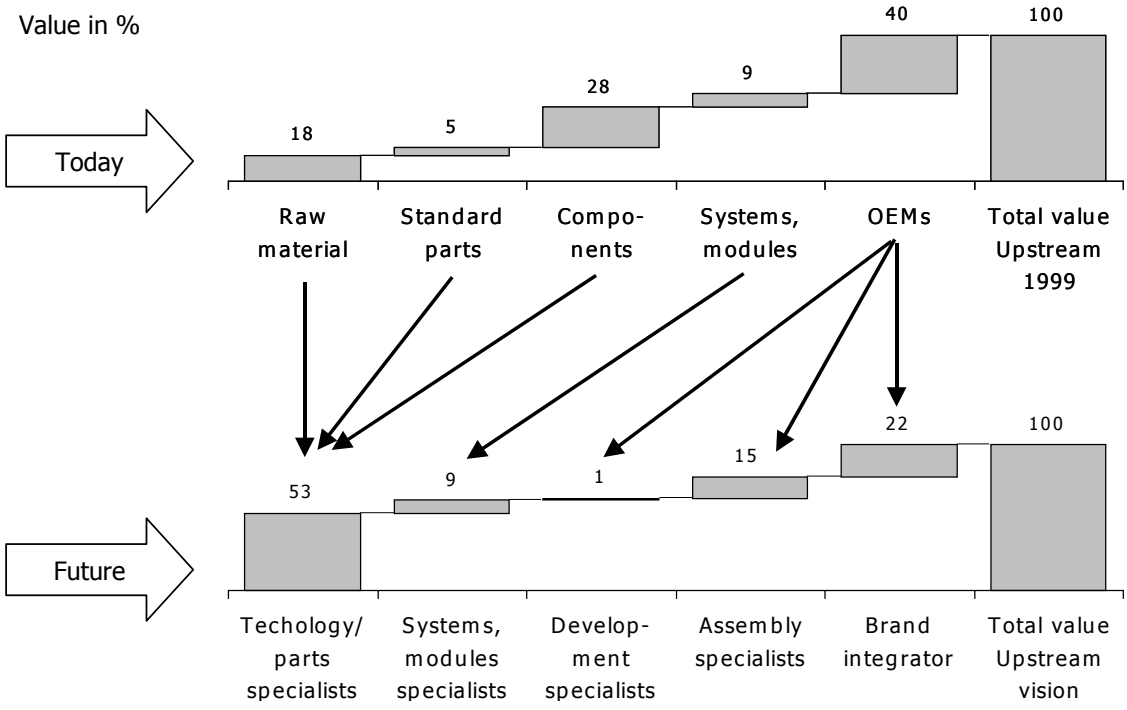
Takeishi and Fujimoto summarize their analysis of the differences between Western and Japanese approaches as follows: "Western automakers have a strong inclination toward 'modularization in inter-firm system,' or outsourcing, which has stimulated 'modularization in production.' One of their challenges is to cope with the inconsistency or conflict created between such 'modularization in procurement/production' and 'modularization in product architecture.' Japanese automakers, on the contrary, have focused on in-house 'modularization in production' thus far and have been relatively quiet about aggressive outsourcing adopted by Western counterparts. Automakers in Japan instead seem to seek for 'modularization in product architecture' facilitated by the need for the functionality and conformance quality of modules assembled on in-house subassembly lines." (Takeshi/Fujimoto 2001: 5)

## 5.2 The Trend towards Specialisation

The trend towards modularisation is going along with a trend towards increasing specialisation and this affects the way the value chain is coordinated and controlled. While in the past the OEMs tried to control more or less all steps of the process chain of its suppliers, each of the new specialised groups develops its own area of responsibility now. It is possible to distinguish between four different groups of specialists: firstly, the group of companies specialising on components that require high technology expertise (e.g. KS, Mahle, GKN and Meritor). The second group specialises on systems and modules (examples are Visteon, Lear, Johnson Controls, and Bosch). The third group specialises on product

development tasks such as computer-aided design, prototyping, testing etc. (e.g. firms like EDAG Engineering, AVL, Bertrandt and Rücker). The fourth group aims at becoming assembly specialists (e.g. Karmann, Bertone, Matra, Pininfarina, Magna, Valmet, etc.). Most companies of this group have engineering capacity to develop whole cars stopping short of the point of becoming brand name companies themselves. The fifth group would be the former OEMs, which become the brand integrators focusing on product planning and marketing. Because of this tendency of specialisation, the image of "networks" seems more appropriate than the image of the OEM-dominated "pyramid" to describe the new configuration of actors. In any case, OEMs will be increasingly unable to control the relations in a (quasi-)hierarchical manner. Thus, they lack the competences to specify and control the work of suppliers in the same way as they did in the traditional system. Figure 4 shows the transition from the specialisation pattern, which was still prevalent in the late 1990s to the specialisation pattern described above. The author also gives some estimates about the shifts of weights between the different actor groups in terms of their share of the total value.

**Figure 4: Shifting weights due to the segmentation of the value chains**




Source: Küspert (2000)

The emergence of new forms of specialisation deeply affects structures and strategies of all actors in the automotive sector. Deverticalisation of the OEMs and the division into tiers of the supply industry means that suppliers have to cope with an increased volume and scope of work. At the same time, they have to find their places in a changed configuration of actors. Most suppliers longer have direct contact to the OEMs and, therefore, lose the personal and social

contacts that in the past often had been the source of learning about new business opportunities and future directions discussed at the OEMs. At the same time, new technical concepts like modularisation require new capabilities to integrate different technologies and new capabilities to cooperate within supplier networks and with the OEMs. This development leads to three types of challenges of co-operation across company borders, which will be discussed in the following section.

## 5.3 Niches and Specialists Related to the Sports Car/Racing Tradition

This is another important area of European distinctiveness (cf. Chanaron 2002) Since the early years of the history of the automobile, Europe has been the centre of niche luxury cars/sports cars/racing cars. While some of the renowned companies in this field have been taken over by bigger players, many have remained independent. These firms are in most cases embedded in a network of production, engineering, and other support firms. The formula one complex in the UK may serve as an example here. “Motor Sport Valley”, as the complex is called by Henry and Pinch (2000), dominates the world production of racing cars. The industry employs more than 30,000 people and consists of around 200 small and medium-sized firms clustered around Oxfordshire in Southern England. Approximately three quarters of the world’s racing cars are designed and assembled in this region including the vast majority of the most competitive formula 1 cars (Henry/Pinch 2000: 192; see also Pinch et al. 1997). While the UK may have lost its role as mass production location for cars, it remains to be the centre for the formula one complex. The number of employees employed by a great number of small specialist firms around this complex altogether is equal to a fully-grown car manufacturer. A similar though smaller network can be found around Bologna in Italy (cf. Bardi/Garibaldo 2001).

The industry structure of specialised small and medium companies supporting the sports car and racing complex – engineering service firms as well as firms for prototyping and manufacturing – became a valuable asset for car manufacturers seeking to differentiate their product range and create attractive niche cars in the 1990s. In this way, Europe had fewer problems with “look alike” cars than General Motors. For instance when differentiating models of its various brands in North America.

# 6. Challenges for Cross-company and Inter-organisational Cooperation

## 6.1 Cooperation at the Point of Assembly

Related to the goal of modularisation but also to the goal of reducing the amount of capital investment, new concepts for integrated production sites have been developed during the 1990s. The “Europeanness” of this approach has to be relativized. First, in view of the fact that the American Big Three also pursued this approach in planning their new factories in South America. Second, in view of the fact that Nissan’s European assembly plant in Sunderland had played an important pioneering role in developing supplier integrated production sites. In North America resp. Japan the car manufacturers proceeded much slower and failed in their efforts to implement similar programmes (the prominent example is the Yellowstone project of GM). European carmaker in many cases used new plants, which were set up in the emerging markets as experimentation grounds in the 1990s. The same holds true for the Big Three, as was mentioned, in their modular plant approach for Brazil such as the Campo Largo project of Chrysler, the Amazon project of Ford and the Blue Macaw project of General Motors (Posthuma 2001; Salerno/Diaz 2002; Parente/Kutabe 2001). In the meantime, the American carmakers have also implemented modular plant concepts in North America.

There are different variants of the approach of modular supplier-integrated production sites:

- Supplier parks (Fiat Melfi, Ford Saarlouis, Nissan Sunderland, Renault Sandouville and many others);
- OEM/supplier Condominia (suppliers under the OEM roof) – Skoda, etc.;
- the consortium approach – Volkswagen Resende; Smart – Hambach.

Although it is not the most far-reaching regarding the integration of suppliers, the supplier park model has turned is the model most widely followed. Table 3 lists 35 supplier parks in Western Europe in 2002 (Automobil-Produktion April 2002, p. 122; cf. also Larsson 2001 who reports 19 supplier parks in 1999).

**Table 3: Supplier Parks in Western Europe 1999**

| *Location* | *Manufacturer* | *Status* |
|---|---|---|
| Ingolstadt/Germany | Audi | Ten suppliers in park |
| Neckarsulm/Germany | Audi | Eleven suppliers in park |
| Wackersdorf/Germany | BMW | Ten suppliers in park |
| Regensburg/Germany | BMW | Utility service centre/under construction |
| Leipzig/Germany | BMW | Under construction |
| Sindelfingen/Germany | DaimlerChrysler | Ready |
| Rastatt/Germany | DaimlerChrysler | Ten suppliers in park |
| Untertürkheim/Germany | DaimlerChrysler | Aggregate plant, ready |

| *Location* | *Manufacturer* | *Status* |
|---|---|---|
| Mannheim/Germany | DaimlerChrysler | Ready |
| Melfi/Italy | Fiat | 18 suppliers |
| Köln/Germany | Ford | 12 suppliers |
| Genk/Belgium | Ford | Ready |
| Dagenham/Great Britain | Ford | Aggregate plant, ready |
| Saarlouis/Germany | Ford | Nine suppliers in park |
| Valencia/Spain | Ford | 28 suppliers in park |
| Antwerpen/Belgium | GM/Opel | Ready |
| Bochum/Germany | GM/Opel | Being planned |
| Rüsselsheim/Germany | GM/Opel | 40 suppliers in park |
| Ellesmere Port/Great Britain | GM/Vauxhall | Three suppliers in park |
| Halewood/Great Britain | Jaguar | 15 suppliers in park |
| Hambach/France | MCC | 13 suppliers in park |
| Sandouville/France | Renault | Five suppliers in park |
| Trollhattan/Sweden | Saab | Ready |
| Martorell/Spain | Seat | Nine suppliers in park |
| Abrera/Spain | Seat | 26 suppliers in park |
| Brüssel/Belgium | Volkswagen | Seven suppliers in park |
| Dresden/Germany | Volkswagen | Ready |
| Mosel/Germany | Volkswagen | 13 suppliers in park |
| Wolfsburg/Germany | Volkswagen | Ready |
| Wolfsburg/Germany | Volkswagen | Ready |
| Bratislava/Slovakia | Volkswagen | Ready |
| Pamela/Portugal | Volkswagen | Eleven suppliers in park |
| Hannover/Germany | Volkswagen | Commercial vehicles being planned |
| Torslanda/Sweden | Volvo | Eight suppliers in park |
| Gent/Belgium | Volvo | Seven suppliers in park |

Source: Automobil-Produktion (April 2002, p. 122)

In order to reap the benefits of proximity with their major tier-1 suppliers, many OEMs have made arrangements with the local authorities to create supplier parks adjacent to or at least nearby their assembly plants. Often the infrastructure investments are carried jointly between the OEMs, suppliers, investor groups and the local community in the form of public-private partnerships.

After learning from the experiences of Nissan in Sunderland, Fiat in Melfi, etc., Ford of Europe seems to have developed a lead model for such supplier parks. It aims at an “agile complexity management” (Schardt 2001) at the OEM plant and the suppliers. It allows an optimisation of just-in-time and in-sequence delivery and material handling. It also minimises investment in production assets. Last, but not least it allows avoidance of lock-in effects. The following are key elements of this supplier park concept:

- Investment and planning are done by an external investor;
- building structures are designed according to supplier needs;
- buildings are leased by suppliers, contract duration corresponds with supply contract duration;
- supplier and OEM plant are linked via a bridge conveyor;
- pay-on-production: The OEM pays the supplier on a piece-by-piece basis as parts arrive at the point of assembly.

Ford took the pay-on-production idea a bit further with the refurbishing of the Cologne plant for the production of the Fiesta. Two equipment suppliers operate the body shop at Cologne in a joint venture with Ford of Europe. The two suppliers, body-welding machinery maker Comau and Kuka, own and maintain the equipment. Ford workers carry out the assembly operations.

More recently, the Big Three have opened up supplier parks at some of their refurbished assembly plants in the USA. In August 2002, Ford opened its first supplier park adjacent to the Chicago assembly plant. At least 12 suppliers are expected to operate in the park when production begins in 2004. Suppliers will lease space in buildings owned by a joint venture between Ford and a Chicago land developer (cf. Automotive News, August 5, 2002). Another example of supplier parks of American OEMs is the Jeep Liberty assembly plant of DaimlerChrysler in Toledo.

In addition, Nissan in its new assembly plant in the USA in Canton, Mississippi, follows the supplier park approach. At Nissan in Japan, the Canton plant is regarded as a learning ground for the company's main operations in Japan.

The *condominium approach* goes a step further. In this case, suppliers operate under the same factory roof as the OEMs. Due to outsourcing and deverticalisation, OEMs often do not need the gigantic space of their legacy factories any longer and therefore offer part of their factory space to suppliers. Examples for this approach can be found, for instance, at Skoda in its huge factory in Mlada Boleslav. In view of industrial relations problems with different wage levels and the presence of worker interest representation under the same roof, this approach has remained the exception, however.

While the condominium approach can be found in Japanese plants, such as Nissan's Tochigi plant in Japan, union representation issues, set limits to this approach in Germany and in the USA.

The *consortium approach* goes a step further still. This approach has been pursued in some cases where new factories were set up with suppliers sharing the initial investment for the plant and operating part of the plant under their own responsibilities. Examples for this are Volkswagen's truck plant in Resende, Brazil, and the Smart assembly plant in Hambach, France. At Resende, the "modular consortium" in terms of employment leaves the OEM, Volkswagen, in a minority position. Out of the 1.850 people working at the VW truck plant in Resende in February 2002, 460 were Volkswagen employees, 650 are from the nine partners of the modular consortium and subcontractors employed 740. Volkswagen employees were not involved in the assembly operations, they have concentrated on quality assurance, coordination and related tasks.

The Achilles heel of such a set up lies in the production system of the suppliers and their control over quality and delivery from their own suppliers, and in the industrial relations situation. The smallest conflict at one of the suppliers immediately affects the whole operation. In view of this conflict potential, at Resende, all employees are represented by the same union and, as a consequence, remuneration for given qualification levels are the same. Also at the Hambach plant issues of pay and working conditions are coordinated by a committee representing the companies of the consortium. Thus the consortium approach, similar to the condominium approach, does not lend itselves to attempts of benefiting from pay differences between OEMs and suppliers.

The experience at the Smart plant in Hambach where twelve systems partners work together with MCC, the DaimlerChrysler affiliate responsible for the Smart car brand, also has shown the difficulties of finding a fair and robust financial solution. Investments in the case of these plants were calculated based on a yearly production volume of 180,000 cars. The contracts between MCC and the suppliers had a clause, which obliged MCC to pay "compensation" to its systems' partners in case actual production volume remains below this target. However, actual production volume remained far below the planned volume. Consequently, MCC had to pay a considerable amount to compensate its partners in the year 2000. After this experience, MCC insisted on renegotiation of the contracts that now have a "risk-and-revenue" clause according to which suppliers have to share the risks of market volatility in the future.

The integrated production-site concepts largely follow Japanese examples and the essential features of their operation (just in time, in sequence etc.) have been developed in Japan long before already. The European and American carmakers carried some of the basic ideas further and used their new plants in emerging markets often as experimental ground. This is particularly true for Brazil where, as Parente and Kutabe noticed, "… particular firm characteristics, local conditions and operating environment (…) seemed to have accelerated the convergence of modularity and supply chain management, leading to the adoption of modular strategies in the automobile industry" (ibid.: 32). With the new concepts, logistical and operational management aspects learned from Japan can be implemented while, economically, risks of lock-in effects can be reduced.

## 6.2 Cooperation at the Point of Product Development

The "model-offensive" of European carmakers in the 1990s – with the multiplication in the number of niche cars – could not be handled by the OEMs alone. In addition to shifting the production and increasingly also the product development tasks to suppliers the OEMs also rely more and more on independent engineering service firms. Therefore, firms like Edag, AVL, Bertrandt, Rücker, CADFORM, MSX Engineering, etc. quickly grew in size and a number of them developed full-car development capabilities ranging from styling and concept development to the building and testing of prototypes. Table 4 shows the rapid growth of these companies in Germany in recent years.

**Table 4: Growth of Engineering Service Companies in Germany 1997-2000 (Selected Examples)**

| | Number of Employees 1997 | Number of Employees 2000 |
|---|---|---|
| Edag Engineering + Design AG | 1.650 | 3.600 |
| AVL Deutschland GmbH | | 1.900 |
| Bertrandt AG | ca. 750 | 2.807 |
| Rücker AG | 600 | 1.700 |
| IVM Automotive Engineering GmbH | 1.200 | 1.700 |
| IAV GmbH Ingenieurgesellschaft Auto und Verkehr | 780 | 1.900 |
| FEV Motorentechnik GmbH | 1.000 | 750 |
| GIF GmbH | 120 | 250 |
| Genion Fahrzeugtechnik GmbH | 51 | 104 |
| CADFORM – MSX Engineering GmbH | | 200 |
| csi GmbH | 25 | 70 |
| Scala Design GmbH | 15 | 20 |

Source: Erig (2001/2002), Vol. 2

In the 1990s, the proportion of external R&D for OEMs increased to between 10 and 20%. At the same time engineering service firms play an essential role in substituting for capability deficits of the suppliers, which now had to cope with a larger development responsibility. Engineering service firms were also key in developing the modules for the suppliers (cf. Blöcker 2001; Rentmeister 1999).

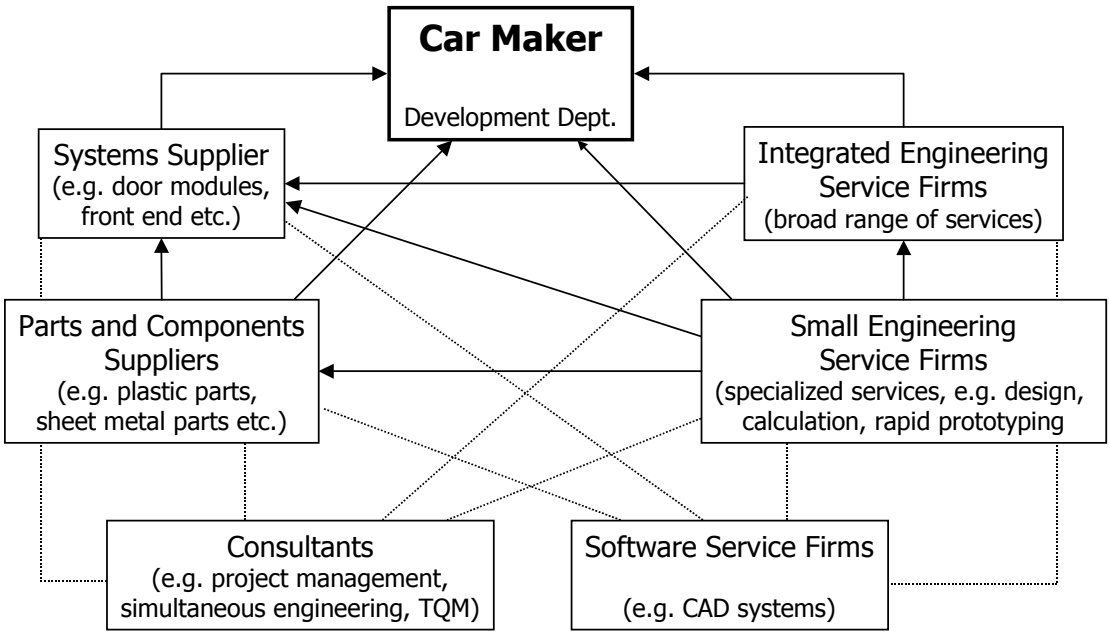
Thus engineering service companies play an increasingly important role in the network of actors involved in new product development. Most ES companies specialise in either product or process engineering, and in either the propulsion system or the body-interior parts of the car. In view of the shortening of time-to-market requirements and in order to compensate competence gaps of suppliers, engineering service firms often become third partners in the cooperation between suppliers and OEMs for new product development (cf. Volpato 2002). Empirical studies show a very complex picture of interactions between the various actors in these networks. Thus in a recent study, Jürgens et al. (2000) found three different situations of network development activities:

- Joint development activities on site, at the car maker's engineering complex and within the framework of its cross-functional engineering teams;
- joint development activities at the site of the engineering service firms, with visiting engineers from carmakers and from the carmakers' first tier suppliers and, in some case, also suppliers of process equipment;

– joint development of modules and components between two and more OEM suppliers, joining at one of the companies including, in some cases, process equipment makers and engineering service firms.

In general, communication and cooperation issues have become an increasingly important area of learning and capability building. As in the supply chain for car production, the process chains for car development have become more fragmented and actors are specialising on specific roles. The emerging new actor constellation is shown in figure 5.

**Figure 5: Network for car development (actors and relationships)**




Source: Rentmeister (1999: 13)

## 6.3 Cooperation at the Interface between the OEMs and the Small and Medium Enterprises (SME)

Networking between small and medium enterprises is another area of developments, which seem to reflect European distinctiveness. Networks of suppliers „must be defined as an operative concept, involving both hierarchical and coordination mechanisms, in dynamic environments." (Camacho 2001: 4)

A couple of factors have fostered this development in the European context:

– The existence of "industrial districts" in a number of European regions (around Turin, Stuttgart etc.);
– industrial policies by state actors on different levels (European, national, regional);
– the policy of OEM to avoid becoming dependent on "mega-suppliers", a publicly stated concern of OEMs.

The network approach currently pursued in numerous European regions is based on Michael Porter's theory of clusters (cf. Porter 1998). The political support of networking constitutes a new pillar for strategies, aiming at "Structural change and adjustment in European manufacturing" (Liikanen 2000). In view of new strategies and structures of multinational enterprises (MNEs) the European Commission sees the need to protect small and medium enterprises and regards clustering as a means to achieve this goal. "At present an increasing number of MNEs are becoming integrated Europe-wide organisations. They build, and operate through, production and subcontracting networks that span the whole of Europe … The progress in information and communication technologies (ICT) has made access to networks easier for all firms. Nevertheless, it remains true that larger firms have more possibilities to build and participate in such networks throughout Europe. … Policy needs to focus, therefore on local impediments to investment and on the difficulties of SMEs to build and to participate in European-wide networks." (Liikanen 2000: 10f.)

**Figure 6: Networking: European Best-Practice Regions**

- Austria/Upper Austria: Automobile cluster, established in 1998, is experiencing a rapid growth. In late 1999 the network has more than 270 members "for which a wide range of services is provided".
- Austria/Styria: ACstyria, established as a pilot cluster in 1996, "earmarking Styria as a top automotive region in Europe".
- France/Nord-Pas de Calais: one of the top automotive regions. "The regional car manufacturers, the technology poles and some of the leading automotive companies have started promising network initiatives. Lacking a common interface and in absence of a focus on small suppliers, these, however, have remained isolated from each other."
- Germany/North Rhine-Westphalia: Verbundinitiative Automobil NRW, set up in 1993 "to strengthen the competitiveness of the regional automotive suppliers".
- Great Britain/Wales: Welsh auto forum, set up 1998 as a collective body for the self-help of automotive suppliers.
- Italy/Piemonte: Unified platform for regional technology network is still missing.
- Spain/Basque Country: Technology networking is co-ordinated by the cluster grouping ACICAE (Agruparación Cluster Industrias Componentes Automoción Euskadi), established in 1992.*

* "Being a grouping of 27 leading automotive suppliers the well-structured organization is advancing the interests of the suppliers in various fields, including technology. The ACIAE also acts as an interest representation of the suppliers vis-à-vis the regional government and the car manufacturers." (Cf. Alaez et al. 2001.)

Source: Based on Agiplan (1999: 2)

Thus, regional networks are supported by national or European funds. They provide information and communication services to its members; provide support of cooperation projects, qualification programmes, public relations and marketing. Based on "best European practices" (Agiplan 1999: 89ff), the Euro-

pean Commission Enterprise Directorate-General (2001) promotes regional networking and gives a detailed information on the basic organizational principles for networks. Figure 6 lists the European “best practice regions” of 1999.

European policies aiming at the strengthening of SME is supported by OEMs, which try to avoid depending on “mega-suppliers”. The cluster approach shall be illustrated by the example of the Automobile Cluster (AC) of Upper-Austria, which seems to be one of the most successful clusters.

AC describes itself as the largest cross-industry automotive network of Austria. It is aiming at strengthening the international competitiveness, innovativeness and cooperation of its partnering firms, in particular small and medium firms. It is supported by EU (European Commission 2000a) and Austrian funds (Zukunftsfonds des Landes Oberösterreich; this money comes from privatisation of state companies). It is a branch of a regional development and marketing firm (cf. www.automobil-cluster.at).

The catalogue of AC member companies is entitled “The virtual cluster auto” claiming all-round capability to make a car. In fact, in terms of revenues and employees the cluster equals a full-size OEM. Total turnover of the cluster is 155 billion ATS; thereof 86 billion in the area of automotive. The cluster has 59,000 employees.

The majority of supplier firms in the network are small and medium: 71% of AC partners employ less than 250 employees. An important element of the cluster approach as it has evolved in Europe over the last year – not least with EU support – is its internal organisation and existence of a support team. The Support activities provided by an AC team are in five areas:

- Information and communication: a data bank of the AC partner teams, information on network activities, plant visits, etc.;
- qualification: various activities for further education, workshops, inter-company learning, study tours, etc.;
- cooperation: cooperation projects between firms and technology transfer institutions;
- marketing and public relations: information material, fares, presentation of partner companies at OEM and tier 1 companies;
- internationalisation support: networking with foreign automobile initiatives; response to requests of foreign companies concerning cluster firms, etc.;
- support of cooperation projects encompassing minimum three AC partners concerning costs for personnel, external services and other.

The overall aim of the cluster approach is to develop capabilities at small and medium enterprises and link them up to the developments described before (cf. Grammel et al. 2000). While similar approaches of supporting small and medium companies can also be observed in the other triad regions (cf. Whittacker 1997 describing the development of the Ota Ward near Tokyo, and Best 2001 referring to initiatives in the USA), the development of an active approach of organising small and medium companies on a regional basis in order to compete with global players seems to be very much a European speciality.

# 7. Conclusions

To what extent does it then make sense to speak of a distinct European auto approach? The analysis has shown a number of factors supporting the hypothesis of a European distinctiveness. The following short list summarises the main findings in this paper:

(1) We can indeed observe a distinct European concern to align industrial policy aiming to increase competitiveness and foster ecological goals with elements of a social policy, aiming to increase social cohesion, social dialogue, and a human oriented system of work with worker participation, a high emphasis on skills and trust relationship. There is nothing equivalent to this approach in the other two regions of the triad.

(2) European and national level regulation have fostered the development of a particular European market segment of Diesel cars that – similar to the light truck segment in the USA and the mini cars in Japan – has opened up regional specific growth opportunities which partially explain the positive development of Europe's auto industry at the turn of the century.

(3) European level policies aiming at non-Taylorist production alternatives so far have not resulted in a clearly different, European approach towards production. The strong anti-Taylorist tradition, especially in Scandinavia, has had the unintended effect, however, to induce production planners in European auto companies to develop modularisation concepts, which were to play a key role in the restructuring of the supplier sector in the 1990s.

(4) The industry structure of independent and innovative suppliers supported the development of specialisation patterns different from the pyramid structure found in Japan. Instead, network structures of specialised independent companies emerged as the basis of the new European auto system in the late 1990s.

(5) The existence of a large specialised firm structure of small and medium companies supports the tendency of specialisation in outsourcing. The European industry has at its disposal a large specialised firm structure for shared product development and production tasks. The mostly small and medium companies in turn rely on an infrastructure of public research and training institutions.

In conclusion the European approach taken in the course of the restructuring of the supplier industry in the 1990s gave Europe a lead in the development of specific capabilities related to cross-company and interorganisational cooperation. If the future lies in the increased specialisation of actors in the value chain, the European automotive industry seems to be particularly well positioned in terms of structures and capabilities.

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